

in this context. The State has also shown that by limiting Dr. Murphy's examination of Dr. Olsen to the PCA, he cannot offer a reliable rebuttal of Dr. Olsen's work. Lastly, the State has shown and Dr. Murphy's deposition testimony demonstrates that sampling location is essential when evaluating Cargill growers' impact on the watershed. However, the Cargill Defendants deny that they know where their waste is applied.

I. Discussion

A. Dr. Murphy's opinions as to the sources of phosphorous in the IRW are in direct contradiction with Defendants' expert Dr. Glenn Johnson.

Defendants, in their attempt to rebut the State's experts, have taken a shotgun approach, attacking every detail without offering any meaningful analysis or alternative explanations as to why there are excessive levels of phosphorus and bacteria in the IRW. As a result, Defendants' experts end up in sharp contradiction with each other, demonstrating their lack of reliability.

Dr. Murphy's primary critique of Dr. Olsen is that Dr. Olsen should have performed a "multimedia" PCA, i.e., one that examines both solid and liquid phases at once. DKT #2190, Ex. A (Murphy Rpt., at pp. 13-15). Despite this claim, the State has shown that a multimedia PCA is not useful and is, in fact, unworkable in this instance because the forms of and relationships among the poultry waste constituents change when they come into contact with rain water. Simply put, a multimedia PCA analysis cannot work in this context. *See* DKT #2083, Ex. C (Loftis Decl., ¶ 9). Importantly, Defendants' expert Glenn Johnson, Ph. D. (Dr. Johnson), agrees with Dr. Olsen on this point:

Olsen's PCA applied to this data set did not resolve sources because these chemicals are not conservative in the environment. That is, they do not

behave similarly in an aqueous environment. Diagnostic chemical differences and ratios that might be observed in the original presumed source materials (i.e. poultry litter, cattle manure, and WWTP effluent) are not preserved once those constituents are in water.

DKT #2169, Ex. 1 (Johnson Rpt. at p. 70). Dr. Murphy, on the other hand, maintains that a multimedia PCA is appropriate, but offers no evidence as to why he believes the poultry signature would remain intact throughout the environment.

This is not the only instance in which Dr. Murphy's opinions are in direct conflict with Dr. Johnson's opinions. Dr. Murphy opines that the pervasive phosphorus pollution in the IRW is the result of "native soil runoff." *See* DKT #2190, at p. 6. In contrast, Dr. Johnson, who originally opined that the pervasive phosphorus in the IRW was a result of "natural" occurrences, now admits that the sources are *not* natural. *See* DKT #2169, at pp. 5-6; Ex. 2 (Johnson Decl. at ¶ 6). The opinions of Drs. Murphy and Johnson are in irreconcilable conflict and highlight the lack of scientific knowledge among Defendants' experts. It is important to note that neither Dr. Johnson nor Dr. Murphy offers a truly competing view of how the phosphorus came to be in the soils and waters of the IRW -- they merely offer conclusory and flawed critiques of the State's experts' analysis. The reason Dr. Murphy cannot offer a competing theory is that if he could objectively and properly perform the PCA on IRW data, he would come to the same answer as Dr. Olsen, namely, that the pervasive phosphorus pollution in the IRW is the result of the excessive land application of poultry waste running off of pastures and into the IRW waterways.

B. Dr. Murphy's multimedia PCA methodology is unreliable and his use of multimedia PCA violates even his own usual practice.

Dr. Olsen's single media (water) PCA method is well accepted in the scientific community and specifically adopted in instances similar to this case. *See* DKT #2198, at

pp. 5-9. Dr. Murphy's multimedia PCA approach would be novel if applied to the circumstances in this case, is not generally accepted among the scientific community, and has not been validated in peer reviewed publications.

In Dr. Murphy's original report he went into great detail as to why Dr. Olsen should have run a multimedia PCA. DKT #2190, Ex. A (Murphy Rpt., at pp. 13-15).¹ Despite the claims in his report, Dr. Murphy later admitted under oath that a multimedia PCA is not useful for identifying sources when a chemical signature is not preserved from one media to another:

- Q: Did your PCA involve more than one media?
 A: It did, although not at the same time.
 Q: Okay. So you did a separate, let's say, liquids media PCA from a solids media PCA?
 A: Yes.
 Q: Why did you not combine them together in that case?
 A: Well, because the fingerprint isn't preserved going from one medium to another. Again, different PAHs have different transport properties in the environment.
 ...
 Q: On Page 30 of your report, Dr. Murphy, you reference a couple of examples by citing papers of successful use of multimedia PCA analysis; correct?
 A: Yes.
 Q: Do you know whether in all circumstances multimedia analysis is appropriate for PCA?
 A: No. I would say it's not going to be very useful when the patterns between contaminants change from media to media because of fate and transport differences.

DKT #2074, Ex. B (Murphy Depo., 50:2-12 & 410:3-12). In direct contradiction with his deposition testimony, Dr. Murphy maintains that in this isolated and single fact scenario

¹ In fact, Dr. Murphy ran a multimedia PCA which he claims invalidates Dr. Olsen's results. DKT #2190, Ex. A (Murphy Rpt., at pp. 17-22, 30-33). It is not surprising that Dr. Murphy's multimedia PCA did not yield the correct results because, as explained herein, a multimedia PCA is inherently unreliable.

multimedia PCA would be appropriate. Dr. Murphy even admits that he has never utilized the multimedia PCA approach he now advocates in an environmental setting:

Q: And is it fair for me to understand that in the two cases prior to the present case, when you employed PCA, you did not use the multimedia PCA evaluation that you employed in Section 5 of your report for this case?

A: That's my recollection.

DKT #2074, Ex. B (Murphy Depo., 51:23-52:3); *See also Id.* at 165:12-21). Dr. Murphy has also not been able to identify any other cases in which multimedia PCA has been used for investigation of nutrient pollution such as the phosphorus contamination at issue in this case:

Q: Can you identify any multimedia investigation where the contaminants of concern were nutrients?

A: Not nutrients, but I know other people at Exponent have done multimedia for various metals.

See DKT #2074, Ex. B (Murphy Depo. 104:6-10).

The State has painstakingly explained that a multimedia PCA is not useful and is unworkable in the circumstances presented in this case because the forms of and relationships among the poultry waste constituents change when they come in contact with rain water, which occurs following land disposal. *See* DKT #2074, at p. 3. In his most recent declaration, Dr. Murphy this time maintains that a multimedia PCA would be valid in this case, but provides no evidence or justification as to why the constituents of the poultry signature would be unaffected as they travel from solid media to liquid media. *See* DKT #2190, Ex. E (Murphy Decl. at ¶¶ 7-8); *but see* DKT #2074, Ex. C (Loftis Decl., ¶ 9) (“The multimedia analysis is not appropriate for the IRW study because PCA takes advantage of relationships or correlations among variables, and these relationships will be much different in the solid phase than in the liquid phase.”).

Defendants and the State agree that Dr. Murphy was charged with examining the PCA alone and did not consider any of the other lines of evidence that Dr. Olsen used to confirm his PCA analysis. DKT #2190, Ex. D (Murphy Depo., 175:18-176:10, 216:22-218:1, 221:8-222:9). Dr. Olsen did not use PCA alone in his analysis of sources of contamination; he used many lines of evidence including a mass balance analysis of phosphorus and bacteria. Dr. Murphy did not utilize these effective tools because Defendants limited his investigation and review. DKT #2190, at p. 12. As a result of this artificial restriction, the only thing Dr. Murphy's testimony is actually saying is that his PCA alone would not justify Dr. Olsen's conclusions concerning sources (and even in this he is wrong). Dr. Murphy's narrow criticism fails to take into account the full scope of Dr. Olsen's methods including his single media PCA.

C. Dr. Murphy's opinions relating to Cargill growers and their impact on the IRW are not based on even the most basic scientific principles.

In his report, Dr. Murphy purports to undertake a comprehensive examination of Cargill's poultry operations impact on the IRW. However, his analysis is doomed from the beginning because it is based on the faulty assumption that he knows where Cargill growers dispose of their poultry waste, when in fact he knows neither the locations where Cargill growers dispose of their waste nor where his samples were taken. Defendant Cargill claims such knowledge is irrelevant to an analysis to quantify its operations' water quality impacts. DKT #2190, at pp. 12-13. This argument flies in the face of logic and Dr. Murphy's prior testimony. Dr. Murphy has already admitted that to properly analyze Cargill's poultry waste impact on the IRW one would have to sample streams *downgradient* from areas that have received Cargill poultry waste. See DKT #2074, Ex. B (Murphy Depo., 198:19-199:22). More importantly Dr. Murphy admits that

Defendants' method of sampling Cargill locations included a loose definition of the words downstream and downgradient.

- Q: Okay, and how were these sample locations selected?
 A: They were selected by Randy O'Boyle.
 Q: And what were the criteria?
 A: That they be downstream or downgradient of Cargill growers.
 Q: Was there any other criteria?
 A: Not that I'm aware of. I think the instructions were to be generous in deciding what was downstream or downgradient.

DKT #2190 Ex. D (Murphy Depo., 297:4-13). It is clear from his testimony that Dr. Murphy maintains that it is essential that samples be taken at locations known to be downstream/downgradient from where Cargill's poultry waste has actually been land applied if Cargill actually wishes to demonstrate that such activities have no impact. This was not done. Most likely it was not done because the Cargill Defendants claim not to know where their growers, or others receiving waste from their growers, dispose of waste generated by their birds. *See* DKT # 2062, Fact ¶ 40 (Cargill doesn't track the poultry litter on its contract producers' farms). Importantly, one would suppose that Cargill (and the rest of the Defendants) could have designed and implemented such an experiment if they knew where their poultry waste was disposed of and truly believed that their land disposal of poultry waste had no impact on IRW waters. No Defendant has offered any such evidence. Obviously, this is because there have been numerous experiments of this kind already performed by a multitude of investigators in the IRW and elsewhere that all demonstrate the obvious -- water runs downhill and rainfall on a waste-applied pasture will collect waste constituents and carry them off the fields as surface runoff or carry them beneath the ground through groundwater migration. It is also clear from his testimony that Dr. Murphy had no idea whether the samples came from the necessary

locations, and in fact had knowledge that the samples were taken in a haphazard manner. *Id.* This basic failure by Dr. Murphy shows his opinions regarding Cargill's impact on the IRW are not based on valid scientific grounds; therefore, they should be excluded. *See* Fed. R. Evid. 702; *Dodge v. Cotter Corp.*, 328 F.3d 1212, 1222 (10th Cir. 2003) ("To be reliable under *Daubert*, an expert's scientific testimony must be based on scientific knowledge . . ."); *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 590 (1993) ("[I]n order to qualify as 'scientific knowledge,' an inference or assertion must be derived by the scientific method. Proposed testimony must be supported by appropriate validation -- *i.e.*, 'good grounds,' based on what is known").

II. Conclusion

WHEREFORE, in light of the foregoing, this Court should enter an order *in limine* precluding the expert testimony of Defendants' witness Brian Murphy with respect to his (1) analysis and opinions derived from his "Multimedia Principle Component Analysis" and (2) any opinion relating to the Cargill growers (and waste associated with Cargill operations) not having an impact on the water quality of the IRW.

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